

Visual acuity using head-fixed displays during passive self and surround motion

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INTRODUCTION. The ability to read head-fixed displays on various motion platforms requires the suppression of vestibulo-ocular reflexes. This study examined dynamic visual acuity while viewing a head-fixed display during different self and surround rotation conditions. **METHODS.** Twelve healthy subjects were asked to report the orientation of Landolt C optotypes presented on a micro-display fixed to a rotating chair at 50 cm distance. Acuity thresholds were determined by the lowest size at which the subjects correctly identified 3 of 5 optotype orientations at peak velocity. Visual acuity was compared across four different conditions, each tested at 0.05 and 0.4 Hz (peak amplitude of 57 deg/s). The four conditions included: subject rotated in semi-darkness (i.e., limited to background illumination of the display), subject stationary while visual scene rotated, subject rotated around a stationary visual background, and both subject and visual scene rotated together. **RESULTS.** Visual acuity performance was greatest when the subject rotated around a stationary visual background; i.e., when both vestibular and visual inputs provided concordant information about the motion. Visual acuity performance was most reduced when the subject and visual scene rotated together; i.e., when the visual scene provided discordant information about the motion. Ranges of 4-5 logMAR step sizes across the conditions indicated the acuity task was sufficient to discriminate visual performance levels. **DISCUSSION.** The background visual scene can influence the ability to read head-fixed displays during passive motion disturbances. Dynamic visual acuity using head-fixed displays can provide an operationally relevant screening tool for visual performance during exposure to novel acceleration environments.

Learning Objective: The influence of the background visual scene on dynamic visual acuity using head-fixed displays will be discussed.

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